U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE GEORGIA STATE COLLEGE OF AGRICULTURE, ANDREW M. SOULE, PRESIDENT; DAVID D. LONG, IN CHARGE SOIL SURVEY.

SOIL SURVEY OF MADISON COUNTY, GEORGIA.

BY

DAVID D. LONG, OF THE GEORGIA STATE COLLEGE OF AGRICULTURE.

W. EDWARD HEARN, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1918.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1921.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., May 28, 1920.

SIR: Under the cooperative agreement with the Georgia State College of Agriculture, a soil survey of Madison County was carried to completion during the field season of 1918.

I have the honor to transmit herewith the manuscript and map covering this work and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1918, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. E. T. MEREDITH,
Secretary of Agriculture.

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SOIL SURVEY OF MADISON COUNTY, GEORGIA.

By DAVID D. LONG, of the Georgia State College of Agriculture.—Area Inspected by W. EDWARD HEARN.

DESCRIPTION OF THE AREA.

Madison County lies in the northeastern part of the State of Georgia. The boundary lines are definitely established where formed by natural features such as streams, but where the line is supposed to follow compass directions there are generally differences of opinion as to the exact location. The boundary lines shown on the map between Jackson and Madison Counties are taken as established in the soil survey of Jackson County. The boundaries of the northeastern part of Madison County between it and Franklin, Hart, and Elbert Counties are taken from established points given by old inhabitants. In some places, however, taxes for parts of the county included within the line as shown are paid in adjoining counties. The area surveyed is 284 square miles, or 181,760 acres.

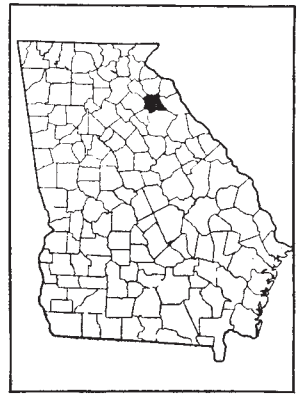


FIG. 1.—Sketch map showing location of the Madison County area, Georgia.

Madison County lies within the Piedmont region of the State. The Piedmont is an old dissected plateau which extends southward from northern New Jersey and terminates in Alabama. It is characterized by a number of topographic forms varying from smooth to rough and broken, but it generally has one significant feature, an even sky line. Madison County is typical of the smoother portions of the Piedmont region.

The general elevation ranges from about 500 to 950 feet. The higher elevations are found in the western part of the county, and the lower ones along Broad River in the southeastern corner.

In detail, the county varies from gently undulating through gently rolling to hilly, with a very small percentage of broken land unsuitable for general farming. The major divides in the southern and western parts of the county represent the smoothest surfaced areas. They are gently undulating and in some places, as in the vicinity of Comer, Colbert, and Planter, are smooth and nearly level. As the stream courses are approached the surface relief becomes stronger, but in general the descent is gradual and the slopes are gentle. In the

northern part of the county the smooth, level crests of the divides become narrower and the slopes more steep, but there are no areas too rough for cultivation with modern implements except in places along the bluffs of some of the streams, and here such areas are not extensive.

A more hilly topography is developed in the northeastern quarter of the county. It is partly due to an underlying formation of hard quartz-mica schist, which has resisted weathering to a greater degree than the other rocks of the county. The topography is strongly rolling to hilly, with a few areas of steep, rough land along the chief streams. The latter have cut deep and narrow valleys, giving a certain degree of ruggedness, especially along Hudson and Broad Rivers. The smaller streams have cut back into the ridges rather sharply and have left a series of ravines, or, as locally called, "hollows." In a few local areas the ridges are so badly cut into by stream laterals that the land is too rough for cultivation. This strongly rolling or hilly area extends southwest from Hart County to a point about 2 miles west of Danielsville. The western boundary is practically Hubbard Creek, while the eastern edge follows the Elbert County line to Broad River and then extends along Little Skull Shoal Creek. Not all the area underlain by the hard rocks above mentioned has the characteristic hilly surface features.

Along Broad River, in the southeastern part of the county, there is a belt about 2 miles wide that is decidedly rolling. This topography is due chiefly to the rapid descent from the crest of the ridges to the river. The streams here have cut deeply into the surface.

Madison County lies in the drainage region of the Oconee and Broad Rivers. The Oconee River system drains the southwestern corner of the county through East Sandy Creek and Little Sandy Creek. The latter stream forms a part of the Jackson-Madison County boundary. Broad River flows through a part of Madison County and then forms the boundary with Elbert County. The South Fork of Broad River with its tributaries drains the greater part of the county. Practically all the streams have narrow strips of bottom land along their courses. Shoals are common in most of the streams, and especially in Broad River. Water power is used locally for running grist mills and gins.

Madison County was organized in 1811. The earlier settlers came from States farther east, while in later years immigrants have come from other parts of Georgia. The population is given by the 1910 census as 16,851, all of which is classed as rural. The western and southern parts of the county are most thickly populated. Danielsville, the county seat, had a population of 323 in 1910. It is the oldest town in the county and is centrally located. Comer, the largest town in the county, had a population of 868 in 1910. Colbert

and Carlton are towns of local importance in the southern part of the county. Ila and Hull are local trading points.[1]

The Seaboard Air Line Railway crosses the county and affords shipping facilities for the southern part. It passes through Carlton (Berkeley Station), Comer, Colbert, and Hull. The nearest shipping points for the northwestern part of the county are Nicholson and Commerce, situated about 3 miles from the Jackson County line. Shipping facilities for farmers in the northeastern section are available at Royston (Franklin County), a town of 1,500 population, whose corporate limits extend to the northeastern corner of this county.

Public roads reach most parts of the county. The roads are of earth construction. Telephone lines extend throughout most of the farming districts.

CLIMATE.

The climate of the general region in which Madison County is situated is marked by long summers with lower temperatures than would be expected for the latitude, and by short, open winters with some short periods of cold weather, during which the temperature may occasionally fall as low as zero.

The highest temperatures recorded for the summer months are 102° F. at Athens and 105° F. at Point Peter. The mean summer temperature is about 78°. The heat of summer is allayed by the convectional thunderstorms, which are common in this region.

The winter months are the most disagreeable. Temperatures as low as 3° below zero were recorded during the cold spell of 1899. During the winter there are comparatively warm periods of several days' duration, followed by rain and a cold day or two, whose low temperature is intensified by the humidity. The mean winter temperature is 43°. During fair weather outdoor work can be carried on in the winter without serious discomfort.

The annual precipitation is well distributed and adequate for growing crops, amounting to 50 inches at both Athens and Point Peter. In the driest year on record the rainfall was 34.53 inches at Athens and 36.58 inches at Point Peter. The heaviest rainfall occurs during the summer months and the winter months. The heavy rains of winter are injurious to bare fields. The lightest rainfall occurs during the fall of the year, and is especially favorable for the harvesting of crops.

The normal growing season, or the average length of the period between killing frosts, is about 225 days. The average date of the

[1] Since this report was written the preliminary announcement of the population of Madison County and its civil divisions in 1920 has been issued by the Bureau of the Census, as follows: Madison County, 18,803; rural, 18,803; Carlton, 342; Colbert, 1,349; Comer, 1,001; Danielsville, 355; Hull, 148; Ila, 232; Royston (in Franklin, Hart, and Madison Counties), 1,681.

last killing frost in the spring is March 27 at Athens and March 29 at Point Peter. The average date of the first killing frost in fall is November 8 at Athens and November 1 at Point Peter. The latest killing frost recorded occurred at Point Peter on April 21, while the earliest fall frost occurred on October 21.

In the following table are given the more important climatic data as recorded by the Weather Bureau station at Point Peter:

Normal monthly, seasonal, and annual temperature and precipitation at Point Peter, Oglethorpe County.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1916).	Total amount for the wettest year (1912).
	° *F.*	° *F.*	° *F.*	*Inches.*	*Inches.*	*Inches.*
December	43.6	78	14	4.22	2.95	2.38
January	42.6	78	9	4.37	2.18	4.45
February	43.3	74	14	5.58	5.75	6.97
Winter	43.2	78	9	14.17	10.88	13.80
March	52.6	85	17	5.22	1.80	11.50
April	59.7	90	29	3.60	1.90	2.99
May	69.5	99	44	2.86	2.35	3.52
Spring	60.6	99	17	11.68	6.05	18.01
June	76.8	102	45	4.38	3.35	6.72
July	79.1	105	56	4.98	9.18	2.97
August	78.0	98	56	5.34	1.73	3.50
Summer	78.0	105	45	14.70	14.26	13.19
September	72.5	98	42	3.63	2.48	3.31
October	60.5	94	26	2.96	1.55	2.18
November	51.3	80	16	2.75	1.36	2.90
Fall	61.4	98	16	9.34	5.39	8.39
Year	60.8	105	9	49.89	36.58	53.39

AGRICULTURE.

The agriculture of Madison County has developed through the successive economic stages which are common to all the inland counties of this section of the State. In its original condition the county was heavily forested. On the uplands hardwoods predominated, with post oak, red oak, and hickory the leading species. There was also considerable white oak, chestnut, and chestnut oak. Shortleaf yellow pine was second in importance. The bottom lands along

the stream courses were heavily timbered with gum, ash, beech, willow, tulip poplar, hickory, and pine.

The first farms were in the uplands, the trees being cut and burned in making the clearings. About 10 acres were cleared on each farm, the land being devoted mainly to food crops. Animal products were early of first importance. Cattle, hogs, and sheep were kept in large numbers on the open range. The early agriculture was self-sustaining, and continued so until about 1870.

The development of agriculture to the close of the Civil War was very gradual, only about 10 per cent of the area of the county being under cultivation in the sixties. Soon thereafter the land was cleared more rapidly, until 1880, when 31.63 per cent of the land in farms was classed as improved. During the following three decades the percentage was increased by 25 per cent.

With this increased acreage there was a decided change in the agricultural practices. As a result of the high price of cotton and the demand for a cash crop immediately following the Civil War, most of the newly improved land was devoted to the production of cotton, and as cotton became the leading crop, the agriculture changed from a self-sustaining type to the one-crop type, with its concurrent evils—deterioration of the soil and the purchase of practically all food products and a large part of the stock feed from other regions.

The agriculture of to-day is a one-crop system centered about cotton production, but there is a tendency toward diversification which may result in making cotton a surplus crop, with large enough acreages in other crops to provide a large part of the food necessary for the farming population.

Cotton is still the only cash crop of the county. According to the census of 1910 it is grown on considerably more than one-half the entire cultivated acreage. In 1909 there was a total of 46,160 acres devoted to this crop, with a production of 19,444 bales, or an average of 0.45 bale per acre, while in 1899 there was a total of 31,831 acres and a production of 11,954 bales, or an average of 0.38 bale per acre. Cotton has become first in point of acreage only since 1880, for at that time the area in corn exceeded that in cotton by over a thousand acres. All the cotton is shipped from the county, as there are no local mills to utilize the product. Langford and Cleveland Big Boll are the most popular varieties of cotton, these varieties together occupying about 75 per cent of the entire acreage. The remaining 25 per cent is divided among a large number of varieties, including the Half-and-Half, Cooks, Russell, and King.

Corn is the second crop of importance. Since 1880 about 25 per cent of the improved farm land of the county has been planted annually to this cereal. In 1909 there were 22,621 acres of corn,

producing a total of 218,517 bushels, or an average of 9.7 bushels per acre. Corn has been a staple crop from the early days of settlement, but within the last 20 years the production has been insufficient for local needs. The crop is used principally as feed for stock or ground into meal for food. During the last eight years the average yield has been increased to about 15 bushels per acre. Prolific varieties of corn are grown almost exclusively. The Marlboro, Hastings, and Watleys varieties are most popular.

Oats are grown to a small extent. The acreage and production are very irregular; in some years from 1,000 to 3,000 acres more is seeded than in others. The average area is 3,000 or 4,000 acres. The census of 1910 reports a total of 3,268 acres sown in 1909, with a production of 40,198 bushels, or an average of 12.3 bushels per acre. The average yield for the county is also quite variable, ranging for different years from 6 to 12 or more bushels per acre. This wide variation is due principally to seasonal conditions. Early summer droughts are responsible for the lower yields. The oat crop is used on the farms for stock feed, being fed in the straw or thrashed out according to the quantity produced and the desire of the individual farmer. A small area is cut for forage while the grain is in the dough stage. The Fulghum is the most extensively grown variety of oats. Texas Rustproof, Appler, and Bancroft are preferred by many farmers. The Burt is used in a few cases for spring sowing.

Wheat is grown to a small extent, and, like oats, is quite variable in acreage from year to year. The average is between 3,000 and 4,000 acres. The yield for the last three census years has averaged 7 to 9 bushels per acre. The total production is used locally, being ground by local mills.

Rye is grown by a few farmers chiefly to supply winter pasturage for hogs and milk cows. Velvet beans and cowpeas are grown to a small extent, and their use is becoming more general. Grains are sometimes cut green for forage, but there is insufficient forage produced in the county to supply the demand.

The farms in general are well supplied with gardens. Sorghum is generally grown to supply the home with sirup. Apples and peaches are produced on almost every farm in quantities sufficient to meet domestic needs.

The raising of hogs and cattle is of very little importance in this county, but in recent years there have been attempts to increase the number of live stock, especially hogs. There is insufficient pork and beef produced to supply the home needs. According to the census there were in 1909 only 5,799 head of cattle, or not quite two to the average farm. Of this number 3,290 were milk cows, averaging one to the farm. The number of hogs reported was 4,515. In 1909 over a million gallons of milk was produced, but this was

practically all used locally. There are at present in the county several herds of improved cattle and purebred hogs.

The agriculture of the county is not sufficiently diversified to enable the farmers to use each soil for the production of crops to which it is especially suited. Cotton is planted on all the upland types of soil, but not to any extent on the bottom lands. The yields on the upland vary to some extent with the soil. The Davidson clay loam is considered the most productive. The Cecil clay loam and Cecil sandy clay loam, which constitute the greater part of the red lands, are also looked upon with favor. The Cecil sandy loam is held in as high esteem as the redder lands by many of the farmers. For cotton it is recognized that in dry years the sandier types, such as the Appling sandy loam, Durham sandy loam, and Cecil sandy loam, yield better than the heavier soils, but in wet and ordinary seasons the reverse is true. The best yields of corn are produced on the bottom lands. On the uplands the Cecil clay loam and Cecil sandy clay loam produce better yields than any of the other soils except the Davidson clay loam. Oats and wheat produce the highest average yields on the red lands.

There is a wide range in the farming methods in various parts of the county. Generally the methods are not as efficient as they should be, especially in the preparation of the seed bed and in cultivation. As cotton is the most important crop it receives the greatest attention. There are many ways in which the land is prepared. The better farmers plow the land thoroughly, usually with 2-horse plows, in the fall of the year, and put it into good tilth by harrowing it in the early spring. After this the rows are laid off, the fertilizer distributed in the rows, and the seed planted. The land may be bedded up or kept level. The general method, however, consists of turning the land with small 1-horse plows and making beds for the new crop either between the former rows or on the old beds, after which the fertilizer and seed are distributed. Cotton is generally planted between April 10 and May 1. The rows are laid off $3\frac{1}{2}$ to $4\frac{1}{2}$ feet apart, the wider spacing being given where the land is more productive and better manured. Cultivation begins soon after the young plants are well above ground. This usually consists of first turning the soil away from the plants and later turning it back. Later cultivations are performed with sweeps and scrapes. The crop is "laid by" during July. The aim in the tillage of the cultivated crops seems to be to keep down weeds more than to conserve the moisture supply. Very efficient methods of cultivation are practiced by about 15 per cent of the farmers. The crop is thinned to a stand by hand hoeing, and in wet seasons, when the grass becomes too abundant, a second hoeing is given. The crop is picked at standard rates per hundred pounds of seed cotton.

Corn is given less thorough preparation and cultivation than cotton, and the generally low yields are chiefly due to this lack of attention and care. Most of the land is prepared with light 1-horse plows, but a small proportion of farmers use 2-horse plows and turn the land well before the seed is dropped. The average number of cultivations is three, although in some cases 5 or 6 cultivations are given. Most of the seed is dropped by hand, but corn planters are becoming more popular. In August the leaves of the cornstalks are pulled for fodder, while the grain is gathered in November. Corn is planted in the water furrow instead of on the ridge, as is nearly always the case with cotton. The crop is planted between March 1 and June 1, but most of it in April.

The seed bed for oats is prepared in a number of ways. The best yields are usually secured where the land is well plowed and harrowed and the seed drilled in. Many farmers, however, broadcast the seed and plow it under with light turning-plows. This necessarily leaves the land in a rough and undesirable condition. Between these two extremes there are several methods, consisting in modification of one or the other. Oats are sometimes seeded in a deep open furrow between the rows of cotton. It is desirable to sow oats in September, although seeding continues to late fall or early winter. The crop is harvested in June. The method of seeding wheat and rye follows closely that of oats.

Cowpeas are often planted between the corn rows at the last cultivation. They are sometimes sowed immediately after oats or other small grain, in which case they are used for forage, the vines being cut in August or September and allowed to cure in the field for some time before storing. Velvet beans are grown to a small extent with corn.

Mules comprise the principal work stock of the county. The implements on the average farm consist of light plows and light implements for cultivation. On some of the better equipped farms heavy 2-horse plows, disk-plows, and subsoil plows, and heavy harrows and improved cultivators are found. A few power implements are used. The barns are generally small, but adequate for the needs of cotton farming. The houses are generally good, especially in the case of farmers operating their own lands and of white tenants.

No general system of rotation of crops is followed in this county. Many fields have been planted continuously to one crop since the land was cleared. Farmers try to change the crops on a field as often as practical, but definite crop rotations are difficult to establish with a tenant system of farming, and under a one-crop type of agriculture.

The fertilizer expenditure of the county in 1909 was $159,218, or $57.50 per farm for each of the 2,769 farms reporting an outlay.

Practically all of this amount was expended for ready-mixed goods, having an analysis of 8–2–2 to 10–2–2.[1] For cotton the common application is 200 pounds per acre. Many farmers use higher grades and larger quantities. When corn is fertilized about 100 pounds of the same grade as that used for cotton is applied. For corn a light application of stable manure is sometimes made. Oats and wheat do not generally receive any fertilizer, although some farmers are beginning to fertilize these crops. In such case 100 pounds per acre is a common application. Sometimes top dressings of nitrate of soda are applied, 100 pounds per acre being distributed during the early spring on oats and wheat.

The census reports an expenditure of $33,942 for labor in 1909. Most of this amount was expended for day labor in hoeing and picking cotton. Labor is usually plentiful.

The farms of the county contain from 10 to 1,000 acres, the greatest number ranging from 10 to 100 acres in extent. The prevailing size is from 20 to 50 acres, as in 1910 there were 1,461 farms of this class out of the total of 3,078 farms of the county.[2]

In 1910, 75.6 per cent of all the farms were operated by tenants. Census enumerations show that the percentage of farms operated by tenants has been increasing materially with each decade. Of the tenants in 1910 there were 1,542 white and 786 colored. The majority of the tenants operate on a share basis. Generally the landlord furnishes the stock, implements, and one-half the fertilizer, and receives one-half of all the products. On a cash basis the land rents for $5 to $10 an acre, depending upon the improvements and the productiveness of the soil, or the rent may be 50 to 60 pounds of lint cotton per acre.

Land values range from $30 an acre in a few places where the farms are less desirable to as much as $160 an acre where the land is well improved and well situated. The average price is about $75 an acre.

SOILS.[3]

Madison County is situated in the Piedmont region of the United States. This region is composed of some of the oldest rocks in the country. They are quite variable, and occur in complex formations.

[1] Formulæ stated in the order phosphoric acid, nitrogen, potash.

[2] The census tabulates each tenancy as a "farm;" hence the preponderance of the smaller sizes. The individual holdings are much larger.

[3] Madison County adjoins Franklin County on the north. Along the boundary line the soil maps of these counties do not everywhere agree. This is due to changes in correlation resulting from a fuller understanding of the soils of the State. The Madison gravelly sandy loam of Madison County mapped against Cecil stony sandy loam in Franklin County is derived from quartz-mica schist, carries a high percentage of mica, and has for this reason been separated from the Cecil soils. Madison County adjoins Jackson County on the west and the Cecil sandy clay loam and Madison gravelly sandy loam of Madison County join areas of Cecil clay loam of Jackson County. These apparent discrepancies are caused by the separation of the Cecil sandy clay loam from the Cecil sandy loam and Cecil clay loam and the establishment of the Madison series.

The upland soils are derived directly from the underlying rocks and usually vary with changes in the composition of these rocks. In Madison County nearly the entire upland is underlain by acidic rocks or rocks high in silica, and consequently the soils belong to the class of sandy loams and sandy clay loams; in other words, nearly all the soils have a sandy surface soil or at least a sandy veneering. Small areas of basic rocks are locally developed which give rise to heavy, red clay loams.

One of the most extensive underlying formations consists of a grayish mica quartz schist which contains a considerable quantity of garnet. Upon weathering, this rock becomes brownish to reddish brown in color, with some small, narrow inclusions of a purplish-red color. Fragments of the weathered rock are characteristically scattered through the entire mass of the resulting soils. Rock of this character is found in some degree over the whole county, but the main body enters the county from the northeast and north and extends southwestward to the Clarke County line and possibly beyond. Practically all the northeastern and north-central parts of the county, extending as far south as a point 3 miles southwest of Danielsville, is made up entirely of this rock, with only small areas of other rocks cutting through the formation. As the southwestern quarter of the county is approached this formation becomes less prominent, while other rocks enter, but their extent can not be judged on account of the deep weathering of the material. Typical areas continue, but generally of smaller extent. In the eastern part of the county this rock is interlaminated with granitic gneisses. From this formation of quartz-mica schist the Madison series of soils is derived.

The second group of rocks comprises granites and granitic gneisses, with some quartz-mica schist. The granites and gneisses are of various textures, ranging from medium-grained through coarse-grained to porphyritic. These rocks are most extensively developed in the southeastern part of the county. From them come the most typical sandy loams of the county, such as those of the Cecil, Appling, and Durham series.

A mixture of rocks of the granitic types with some of the basic rocks such as diorites and hornblende schists gives rise to the Cecil clay loam. This mixture of formations is of limited area. Its largest development extends through Danielsville, cutting through the formation of mica-quartz schist.

Narrow veins and dikes of hornblende schist and diorite occur to a very limited extent, being found near Danielsville and in the northwestern quarter of the county. These dark-colored rocks contain a small percentage of potash and a larger percentage of lime feldspar, as a result of which the soils differ from the other soils of the county,

both in mineralogical and in physical character. The Davidson clay loam is developed from rocks of this class.

The alluvial soils are composed of a mixture of materials coming originally from the same sources as the residual soils of the county, but with modification due to action of running water. The material has been washed down from the adjoining hills and transported and deposited by streams. The material along the rivers no doubt has been deposited far from its source or place of origin. Deposition along all the streams is continuing, new material being added with each overflow. In places, however, soil material may be removed by the flood waters. Soils of the Congaree series and Meadow (Congaree material) comprise the alluvial areas.

The soils of the county are divided into series, each of which contains soils having a common origin and similar color and structural characteristics. These series are divided into types on the basis of texture or relative fineness or coarseness.

The Madison series is characterized by gray to reddish-brown soils, not so red as the soils of the Cecil series, with red subsoils which contain a relatively large admixture of mica when the underlying rocks lie close to the surface. The presence of the mica, the derivation from quartziferous-micaceous rocks, and the brownish-red color are the features distinguishing this series from the Cecil, which it otherwise resembles. Two types of this series are mapped, the gravelly sandy loam and gravelly sandy clay loam.

The Cecil series has soils ranging from light-brown to red, while the subsoil is a stiff, brick-red or bright-red clay, which becomes slightly plastic and very sticky and tenacious when wet. These soils are chiefly derived from light-colored acidic rocks such as granitic gneiss and granite, with some quartz-mica schist. Other schistose rocks such as mica schist and hornblende schist enter into the composition in some places. Where the latter rock occurs the types are generally heavier in texture. Narrow veins of diorite cut through the formations of light-colored rocks in places. Soils of the Cecil series have a wide development, occurring over most of the western and southeastern parts of the county. The Cecil sandy loam, Cecil sandy clay loam, and Cecil clay loam are mapped in this county.

The Durham series has very light gray surface soils and a pale-yellow to bright-yellow, friable sandy clay subsoil. The Durham sandy loam is the only type mapped. It is derived from the weathering of light-colored granite and gneiss.

Between the Cecil and Durham series stands the Appling, which is characterized by light-gray surface soils and mottled yellow and red subsoils which usually become redder as the depth increases. This series is also derived from granite and gneiss, although some quartz-mica schists enter into its composition. The Appling sandy loam

is the only type mapped in this series, but it has a relatively wide distribution.

The Davidson soils are very dark red, with a dark-red subsoil. They are considerably darker red than the Cecil, and are further differentiated by the character of rock from which they are derived, this being a heavy, dark-colored diorite or hornblende schist. The Davidson soils are inextensive, but comprise some of the strongest upland types of the Piedmont region. The clay loam is mapped in this survey.

The alluvial soils are grouped in one series—the Congaree. This has grayish-brown to brown soil and reddish-brown to yellowish-brown subsoil. Relatively large quantities of mica occur in the soil and subsoil. The Congaree fine sandy loam and silt loam are the only types mapped in this county.

Meadow (Congaree material) consists of a mixture of soil material which is so variable in texture and structure that no types can be designated.

In the following pages of this report the various soils of Madison County are described in detail and their relation to agriculture discussed. The table below gives the name and the actual and relative extent of each type:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Cecil sandy loam	54,464	30.0	Cecil clay loam	8,000	4.4
Cecil sandy clay loam	44,352	24.4	Davidson clay loam	3,136	1.7
Madison gravelly sandy clay loam	28,032	15.4	Durham sandy loam	1,920	1.0
Madison gravelly sandy loam	23,040	12.7	Congaree fine sandy loam	896	0.5
Appling sandy loam	8,896	4.9	Congaree silt loam	640	0.4
Meadow (Congaree material)	8,384	4.6	Total	181,760	

MADISON GRAVELLY SANDY LOAM.

The soil of the Madison gravelly sandy loam consists of a grayish to light-brown or yellowish-brown, moderately loose and open, loamy fine sand to medium sand which becomes browner as the subsoil is approached. The average depth of the soil is about 7 inches. The subsoil is a friable brownish-red to red clay. Both soil and subsoil contain an abundance of mica flakes in places where the disintegrated rock lies close to the surface. With the high content of mica flakes the type in some small areas develops a slick, greasy feel. The glistening effect of these flakes in exposures, such as road cuts, is quite pronounced. The surface and the entire 3-foot profile usually contain a large quantity of weathered fragments of the parent rock, which gives the type its gravelly character. Weathered masses of the underlying rock are also very common within the 3-foot profile. The type is practically free from large stone fragments.

This soil occurs in large areas throughout the north-central and northeastern parts of the county. Smaller areas occur in the southwestern part, representing scattered outliers of the main development. The soil is residual from a quartz-mica schist which carries an appreciable quantity of garnet. In the weathered state this rock is of a brownish color and shows an abundance of mica. The color of the unweathered rock is grayer.

The Madison gravelly sandy loam occupies smooth crests of ridges and divides and high ridges with long, more or less gentle, slopes. The larger areas are rolling to strongly rolling, while the smaller areas in the southwestern part of the county are smoothly undulating to gently rolling. In the rougher sections the type in many places gives way to the gravelly sandy clay loam of the series. More than 75 per cent of the type can be farmed successfully with improved implements, but terraces are required in many places to prevent erosion. Drainage is everywhere well established. There are a large number of streams throughout the type, and many of these have cut deep valleys.

This is one of the important soils of the county. More than three-fourths of the type has been cleared of the native forest growth, which consisted of various species of oak, hickory, other hardwoods, and shortleaf yellow pine. Cotton is the chief crop. It gives an average yield of about two-thirds bale per acre, the yield ranging from one-fourth bale to as much as 1 bale per acre, depending upon the method of cultivation. Corn averages about 12 bushels per acre, but yields as high as 40 bushels have been obtained in boys' corn club contests. Oat yields vary from 12 to 20 bushels, averaging about 13 or 14 bushels per acre. The yield of wheat averages about 10 bushels per acre. Cowpeas produce an average of three-fourths ton of cured hay per acre.

Land of this type ranges in price from $30 to as much as $150 an acre, depending upon the location, the topography, and the improvements.

The light, gravelly, sandy surface soil of this type makes preparation and cultivation of the land easy. Light implements can be used with success, but the use of heavier implements and deeper plowing and subsoiling would benefit the type. This soil is generally looked upon as somewhat less productive than the Cecil sandy loam, but under present conditions the yields are about equal. A difference will develop after a long number of years of intensive cultivation. It is therefore advisable to conserve the plant food and to add to this by turning under large quantities of green or stable manures. The soil is low in organic matter. Most of this type is well suited for general farm crops.

MADISON GRAVELLY SANDY CLAY LOAM.

The Madison gravelly sandy clay loam has a light surface veneering of brown to reddish-brown loamy fine sand, loamy sand or sandy loam, which at an average depth of 3 or 4 inches passes into a brownish-red, heavy fine sandy loam to sandy clay loam or clay loam, which in turn grades into a reddish clay. The average depth of the soil is 6 or 7 inches. When the surface portion is properly turned in plowing, sufficient clay is mixed with the lighter sandy material to form a sandy clay loam surface soil. The subsoil is a friable, brownish-red clay, which becomes somewhat sticky when wet. Both soil and subsoil contain a large quantity of mica flakes, coming from the parent rock, which in most places lies within the 3-foot soil profile. In local areas where the rock lies deep, and the material has been more thoroughly weathered, there is less mica present. On the surface and through the entire soil mass there is an appreciable quantity of weathered fragments of the parent rock which give the type its gravelly character. This material is generally soft or "rotten," in contrast to the hard quartz fragments found on other types.

With this type there is included more or less of the gravelly sandy loam type of this series, as these two soils grade imperceptibly into each other, and the line between them must often be arbitrarily drawn. In some places, especially on steep slopes, there are areas of gravelly clay loam, while in other places the material closely approaches a clay loam.

The Madison gravelly sandy clay loam is widely distributed, being developed in large areas in the northeastern, north-central, and southwestern parts of the county. Some of the larger areas lie along Broad River and along the South Fork of Broad River about 2½ miles west of Danielsville. The areas in the southwestern part of the county are smaller and more scattered. In the southeastern part of the county there are small areas which appear to be developed from interlaminated beds which develop to greater thickness in local areas.

This type is derived from the weathering of a quartz-mica schist which carries a quantity of garnet.

The greater part of the type has a rolling to hilly topography, as it seems to be most extensive where the surface relief is greatest. It occupies high ridges, through which the streams have cut deep valleys. It is found on both the slopes and crests of ridges. The slopes generally are only moderately steep, but as Broad River is approached the topography becomes rougher and there are many slopes too steep for successful cultivation. Drainage is well established and, owing to the rapid run-off, there is danger of erosion, which must be guarded against by terracing. In the southwestern and southeastern parts of the county the surface is undulating to gently rolling, and distinct from that of the northern and northeastern parts.

Most of this type has been cleared of the original forest growth. In the remaining areas there are found red oak, post oak, black oak, chestnut oak, hickory, and shortleaf yellow pine. Most of the rougher areas of the type remain forested. A large proportion of this type has been cleared within the last 15 years. The common crops of the county are produced. As most of the land is practically new, the yields are good. Cotton, the most important crop, averages a little less than one-half bale per acre, the yield ranging from one-fourth to three-fourths bale. Corn yields from 8 to 20 bushels per acre, with an average of about 12 bushels. Oats yield from 10 to 18 bushels per acre, and cowpeas an average of three-fourths ton of cured hay per acre.

Land of this type varies in price from $20 an acre in the rougher areas to as much as $150 an acre in the better situations where the farms are well improved.

It is possible that this soil will not prove as durable as the other types of the county, and now, while most of it is new and in a productive stage, every means to keep it in good condition should be used. The protection of the land against damaging erosion, deeper plowing, the rotation of crops, and the use of winter cover crops with the consequent incorporation of large quantities of organic matter, are means to this end. This is a general-farming type more than a special-crop soil.

CECIL SANDY LOAM.

The Cecil sandy loam has a surface soil of yellowish-gray or brownish-gray to light-brown, friable, loose sand to loamy sand, with an average depth of 6 or 7 inches. The subsoil proper is a heavy, stiff but brittle, red clay containing a small percentage of sand. When wet the subsoil has a pronounced stickiness and tenacity. Between the soil and subsoil there is sometimes found a stratum of yellow, friable sandy loam. This stratum varies in thickness from an inch or two to as much as 22 inches, and where it is thickest mottlings of red occur in the lower part, above the heavy red clay. These areas, with a mottled yellow and red, heavy sandy loam extending as deep as 22 inches before the heavy subsoil is found, represent the lightest variation of the type. From this phase there is but a slight gradation to the Appling sandy loam. Where this yellow section is not developed or is very thin the type is found in its heaviest variation. Typically this type is free from any large quantity of stony material, but in some parts of the county there is a liberal sprinkling of angular quartz fragments, sufficient to give it a gravelly character. These areas are indicated on the map by gravel symbols. A few stony areas also occur, the stones consisting of large quartz blocks and broken masses of granitic gneiss and granite. These stony areas are likewise shown on the map by symbols.

There are a number of variations in this type, none of which are of sufficient extent to map separately. Among these are small areas in which the soil is a coarse sandy loam to very coarse sandy loam. The coarse material is partly quartz and partly unweathered rock material. These areas are situated south of Colbert, northeast of Carlton, and north of Newtown. In each place the variation does not cover more than several hundred acres. Some patches of Appling sandy loam and Cecil sandy clay loam also are included, and in the western part of the county there are some areas of the Madison soils that could not be separated satisfactorily. The last are most abundant where the contributing rocks are mixed and the quartz-mica schist rocks predominate in small areas.

The Cecil sandy loam is the most extensive soil in this county. It is most typical in the southeastern part of the county, where it extends over broad areas almost to the exclusion of other types. It enters from Elbert County along Broad River in a wide area, extending from the mouth of Skull Shoal Creek to the Oglethorpe County line. The area gradually narrows to the westward as it reaches Colbert and Hull. The second area of importance is found in the western part of the county extending from a point north of Hix slightly southwestward to the Clarke County line. Smaller but important areas are mapped around Progress School and Moon Grove Church, and between Neese and Colbert. A somewhat isolated area is found in the northeastern part of the county at Berryman. Most of the gravelly areas are in the vicinity of Hix.

The Cecil sandy loam is a residual type from several different rock formations. In the largest area above described, occupying the southeastern part of the county, the contributing rock is known definitely to be light-colored granitic gneiss and granite with a small percentage of quartz-mica schist interlaminated. The rocks vary in texture from medium grained to very coarse grained, and to a small extent are porphyritic. The rocks are exposed in many places, especially within a belt several miles wide following the course of Broad River. The area near Berryman is derived from the same kind of rock. The areas in the western and southwestern parts of the county are more indefinite as to parent rock. In many areas there are very few exposures, but in other places granitic gneiss and light-colored schist and a garnetiferous quartz-mica schist are so closely associated that the parent rock material should be ascribed to a mixture of rocks with the quartz-mica schist predominating.

The quartz found on the gravelly and stony areas is derived from veins or dikes of quartz in the parent rocks. Such veins are seen in road cuts.

The Cecil sandy loam over the greater part of the county has an undulating to gently rolling topography. As Broad River is ap-

proached the topography becomes more rolling, and within a mile or two of the river is decidedly rolling to hilly. The slopes to the streams are generally smooth and rounded. In the southeastern part of the county the type occurs in all topographic positions, while in the western part it holds mainly to the crests of ridges and smooth divides and gives way to the Cecil sandy clay loam, where the relief becomes stronger. Drainage is everywhere well established.

This is one of the most important soils in the county. It is used for general agriculture. About 75 to 80 per cent of it has been cleared of the native forest, consisting chiefly of hardwoods and shortleaf yellow pine. There are numerous small tracts of second-growth or old-field pine scattered over the area.

All the crops of the county are produced on this type, but it is devoted chiefly to cotton and corn. Yields of all crops vary widely with the farming methods, including fertilization. Cotton averages less than one-half bale per acre, although one bale or more is sometimes obtained. With corn the yield ranges between 5 and 40 bushels, and averages about 13 bushels. Oats average about 12 bushels, although considerably higher yields are often obtained. Wheat yields an average of 7 to 10 bushels, and cowpeas for forage from one-half to over 1 ton of cured hay per acre. Garden vegetables and peaches yield good returns, although they are produced only for family use.

Land of this type brings from $30 to $160 an acre, depending upon the location and improvements.

The Cecil sandy loam is considered a desirable soil. The light surface soil can be easily worked into a good seed bed and maintained in good tilth. It can be worked under a wide range of moisture conditions, and can be plowed after light rains without any material damage, such as would result on heavier types. The soil rapidly absorbs moisture, and this passes quickly to the subsoil, where it is held for crops. In very wet seasons water accumulates in the surface section and injures crops. This peculiarity is due to differing rates of absorption in the light sandy surface soil and the heavy clay subsoil. The gravelly areas of the type are less desirable for farming than the stone-free areas.

Besides the general crops, this soil is well suited to the production of peaches, cantaloupes, dark-leaf plug tobacco, and various truck crops, which may be grown either for shipment or for canning. The chief need of this soil is the replenishment of organic matter, as it is very low in this essential of a fertile soil. Deeper plowing, more thorough cultivation, and the use of cover crops are also advisable.

CECIL SANDY CLAY LOAM.

The soil of the typical Cecil sandy clay loam consists of 2 to 4 inches of gray to brownish-gray to reddish-brown, heavy loamy sand to sandy loam, which is underlain either by a red, friable, heavy sandy

loam, sandy clay loam, or clay. The average depth of the soil is 6 or 7 inches. The typical subsoil is a heavy, brittle, stiff, brick-red clay, which becomes sticky and tenacious when wet. The thin surficial covering of sandy material makes the type resemble closely the sandy loam of this series, but in ordinary plowing enough of the heavy clay material is mixed with the sand to form a true sandy clay loam texture.

The areas of this soil include many small patches of sandy loam and clay loam, so intimately mixed that the sandy clay loam is taken as representing the average condition. This type grades in places toward the lighter Cecil sandy loam or the heavier Cecil clay loam. In the southwestern part of the county it includes some areas of the Madison soils, which are so closely associated that separation is difficult.

Most of the type is practically free from stones, but considerable areas in the northwestern part of the county contain a liberal quantity of angular quartz fragments, and are shown on the map by gravel symbols. A few stony areas are also found.

The Cecil sandy clay loam is an extensive soil, occurring mainly in the western half of the county. Large areas are mapped around Fort Lamar, Alvin, and Pocataligo, and most of the gravelly areas are found in these vicinities. Large areas are mapped from Danielsville south to the county line and from Progress School southward through Neese to the Clarke County line. Smaller areas lie in the southeastern part of the county.

In the northwestern part of the county, in the drainage basin of the Hudson River, the contributing rock is chiefly granitic gneiss, with some hornblende schist and to a small extent quartz-mica schist. All the rocks are very much mixed. In the southeastern part of the county the few areas found are derived from granitic gneiss and granite, which contain narrow, interlaminated bands of quartz-mica schist and mica schist. The areas represent places where some of the sandy material has been removed or where there was not a deep accumulation of sand. Thin, narrow dikes of diorite cut through the formations at several points and account for some of the heavy material. In the southwestern part of the county the rocks giving rise to this soil are a mixture of light-colored schist and quartz-mica schist, with the former predominating. The presence of the latter material produces the soil which is a gradation toward soils of the Madison series. The rocks are so intricately associated that it is very often difficult to classify properly the soil types.

The Cecil sandy clay loam is gently rolling to rolling, and all the type can be farmed. Some of the slopes are long and gentle, while others are shorter and more rounded. The type as a whole is less smooth and even than the Cecil sandy loam, and all of it is well drained. The surface run-off is rapid in places and terracing is required to prevent serious erosion.

This is one of the most important soils of the county. It is held in high esteem by the farmers. More than three-fourths of it has been cleared and is used in the production of the common crops. The native forest growth consisted chiefly of hardwoods, such as red and post oak, with some white oak and hickory. Shortleaf yellow pine occurs also. Scattered areas of the native forest remain, but a large part of the timber is second-growth pine. Cotton, corn, and oats are the principal crops. Cotton, the leading crop, yields on the average about one-half bale per acre. The yield ranges from as low as one-fifth bale to 1 bale or more, the higher yields prevailing on well-cared-for farms, usually those operated by the owners. Corn averages 12 to 15 bushels per acre, but considerably higher yields are obtained where there is an effort made to obtain them. Oats and wheat average 8 to 12 bushels per acre. Cowpeas for forage give from one-half ton to more than 1 ton of cured hay per acre.

The price of this land ranges from $30 to as much as $150 or more an acre, depending upon the improvements and location.

The Cecil sandy clay loam is a valuable soil type. It is easily handled, while the clay subsoil is heavy enough to store moisture. The sandy surface soil makes a good mulch to prevent evaporation of soil moisture. The gravelly areas are more difficult to plow and cultivate. This type is well suited to the production of the crops commonly grown in this region, and it is a general farming type rather than a special-crop soil.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Cecil sandy clay loam:

Mechanical analyses of Cecil sandy clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
254817	Soil	8.2	17.6	7.9	27.7	8.5	18.4	11.6
254818	Subsoil	2.1	4.8	2.6	11.8	9.9	22.7	45.8

CECIL CLAY LOAM.

The Cecil clay loam is typically developed as a brownish-red to red, friable, heavy clay loam, with a depth of about 6 inches, underlain by the typical, heavy, stiff, red clay of the series, which extends to a depth well below 3 feet. When wet both soil and subsoil become somewhat tenacious and slightly plastic. The type is practically free from stone throughout the 3-foot profile. In some places there is slightly more sand than typical, so that the type approaches in character the sandy clay loam of the series. On the other hand, there are small areas where the clay loam surface soil is very shallow and the heavy clay is within 2 or 3 inches of the top. Such areas closely resemble the Cecil clay, but are too small to differ-

entiate. A more important variation is developed where the soil and especially the subsoil are deeper red in color and somewhat heavier. The soils in those areas are a close approach to the soils of the Davidson series, from which they are separated in several instances by an arbitrary line. This is especially true of the area northeast of Danielsville.

The Cecil clay loam is not an extensive type. The largest area extends from the vicinity of Danielsville northeastward to about 1 mile beyond Bluestone School. Several smaller areas, which are apparently the continuation of the main body, are found at Wildcat Bridge on Broad River, and south and west of Danielsville between the South Fork of Broad River and Brush Creek. Areas also occur between Rogers and Ila, in the vicinity of Comer, along Beaverdam Creek south of Colbert, and in the northwestern section of the county.

This soil has come from a mixed formation of rocks, including a dark-colored, dense diorite in close association with a porphyritic granite, in which the phenocrysts of feldspar are as much as 2 inches in length, and a dark-colored, medium-grained biotite granite. In the areas along Beaverdam Creek and in the vicinity of Rogers hornblende schist occurs with light-colored schist and gneiss.

The Cecil clay loam is undulating to gently rolling. The surface is generally even, although the slopes are short and rounded. Tractors can be used over practically the entire type, but there is sufficient relief to insure good drainage. Terracing is required on the slopes to prevent erosion.

This type is not extensive, but it is recognized as a strong, productive soil. The virgin growth of oak, hickory, and pine has been removed, but there are a few scattered areas of second-growth pine. The type is used for all the common crops. Cotton averages fully one-half bale per acre, while yields of 1 bale are common in favorable seasons. Corn averages 12 to 15 bushels, and often yields 20 or 30 bushels. Oats and wheat yield from 8 to 15 bushels, and cowpeas as much as 1 ton or more of cured hay. The prevailing price for land of this type is about $100 an acre.

Careful farming methods are needed on this soil to bring out its natural fertility. Heavier implements and work stock are required than on the lighter, sandy types. Deep plowing and subsoiling with the incorporation of organic matter are very beneficial. The physical condition of the soil is seriously impaired by working it in a wet state. This type is best suited for general farm crops, particularly small grains and grasses.

APPLING SANDY LOAM.

The surface soil of the Appling sandy loam is typically a very light gray to yellowish-gray sand to loamy sand, and the subsoil, beginning at an average depth of 7 inches, is a yellow, friable loamy

sand which gradually becomes heavier and passes through a sandy loam and then a light sandy clay. At an average depth of 15 to 18 inches there occurs a hard, dense sandy clay, mottled red and yellow in color, resembling in structure partly weathered rock. This continues to a depth of 3 feet. In most of the smaller areas the subsoil is more friable, and typical of the Appling series. In some places the lower subsoil, below 24 inches, is a reddish-yellow to yellowish-red or salmon-colored, hard sandy clay containing considerable disintegrated rock material. The subsoil differs strikingly in texture and color from that of the Cecil series. Occasionally in the very lower part of the 3-foot profile a red clay similar to that in the Cecil is found, but usually this is marked by faint-yellow mottlings. Small patches of the Cecil sandy loam and Durham sandy loam are included with the Appling, on account of their intricate association. The soil is distinctly lighter in color than the other sandy types, except the Durham, and is locally called "white land." The reflection of light from the surface in the summer time is very intense. The type is generally free from stones.

This soil is mapped in various sized areas in all parts of the county. The largest are found about 2½ miles southeast of Danielsville and in the vicinity of Colbert. Other important areas lie in the vicinity of Berryman, on the north of Vineyard Creek, and between Vineyard and Holly Creeks. The remaining areas, which are generally small, are scattered over the entire county.

The largest areas of Appling sandy loam, and practically all the areas in the southeastern part of the county, as well as those near Berryman, are derived rather definitely from massive granitic gneiss and some granite, the same as those described under the Cecil sandy loam, except for some small inclusions of quartz-mica schist. In these areas the rocks lie close to the surface, and in some places the subsoil grades into the partly disintegrated rock, which generally accounts for the hard, undecomposed material in the lower subsoil. Outcrops of the massive gneiss occur in a few places. In the western part of the county the areas are influenced to a large extent by quartz-mica schist. The many small areas along streams and especially around the heads of streams may be due to the removal of the clay particles in the drainage waters, or to imperfect oxidation.

This type occupies some of the smoother parts of the county. It comprises smooth, gently undulating to gently rolling interstream areas which have long, even slopes to the streams. The areas within about 2 miles of Broad River are rolling and in some places hilly. Around the heads of streams the type occupies gentle slopes or flats.

Practically all this type is under cultivation. The native forest was made up chiefly of shortleaf yellow pine with some oak and hickory. There are a few small areas covered with second-growth or old-field pine. This soil is used in the production of the staple

crops of the county. Cotton, the most important crop, varies considerably in yield, depending upon the season and the farming methods. Yields ranging from one-fifth to three-fourths bale per acre are reported, the average being well below one-half bale. Corn yields are low, ranging from 5 to 15 bushels, with an average of about 8 bushels. Cowpeas return about five-eighths ton of cured hay per acre. The average price of this land is about $50 an acre.

The Appling sandy loam is distinctly different from the other soils of the county, except the Durham sandy loam. Its light color shows that it is in need of organic matter. It is prepared and cultivated with ease, and is an early soil, warming up quickly in the spring and producing early crops. The surface soil readily absorbs moisture, which passes through to the subsoil. In wet seasons the soil fills with water, owing to a rock or impervious substratum, and growing crops may be drowned out. In extreme dry seasons it appears to produce better crops than soils which generally are more productive. The light surface soil can be worked under a wide range of moisture conditions, and with light implements.

A wide range of crops can be produced on this type. Besides being well adapted to the general farm crops, it is suited to a number of special crops. It is used in other places in the production of truck crops such as cantaloupes, asparagus, tomatoes, and potatoes, on a commercial scale, either for shipment or for canning. It is also used in North Carolina and Virginia for light-leaf plug wrapper and cigarette tobacco.

DURHAM SANDY LOAM.

The soil of the Durham sandy loam is a light-gray to almost white sand to loose loamy sand 7 or 8 inches deep. The subsoil, which in the upper part is a yellow loamy sand, gradually becomes heavier with depth and passes through a sandy loam and light sandy clay and, at an average depth of about 20 inches, into a yellow, friable sandy clay that continues to depths of 3 feet or more.

The type shows a few variations. In some places it is slightly mottled in the lower subsoil and closely resembles the Appling sandy loam. These areas are too small and irregularly developed to separate. In a few places the subsoil is very light in color, almost gray or grayish yellow, but areas of this sort are also very small.

The Durham sandy loam is not an extensive soil. It occurs in the southwestern part of the county along the Clarke County line, near Berryman, and between Meadow Church and Comer. It has been formed through the weathering of gneiss and granite intermingled with some quartz-mica schist. The position of some of the areas along drainage ways suggests that the light color has been caused by leaching.

Nearly all the type has been cleared of the original forest, which consisted mainly of shortleaf yellow pine mixed with some hard-

wood, and is now under cultivation. The common crops are grown, but the average yields are lower than on any other soil in the county. Cotton yields range from one-tenth bale to one-half bale per acre, the latter being obtained with heavy fertilization. Corn averages 7 or 8 bushels per acre, oats and wheat yields are very low, and cowpeas produce about one-third to one-half ton of hay per acre.

The Durham sandy loam occupies positions on ridges or along stream courses, the surface, without exception, being smooth. Drainage is well established, owing to the surface relief and the open, loose subsoil.

This is the lightest upland soil of the county, but it is sufficiently heavy to produce the general farm crops with reasonable success when well fertilized. It is a very good soil for special crops, such as vegetables for the early market and bright-leaf plug wrapper and cigarette tobacco. The soil will not retain commercial fertilizers as long as the other soils of the county, and should be applied in two or more applications rather than all at one time. One of the greatest needs of the type is the incorporation of organic matter, as the soil is very low in this essential constituent.

DAVIDSON CLAY LOAM.

The surface soil of the Davidson clay loam is a very dark red—maroon-red—friable, mellow clay loam, with a very low percentage of sand. The subsoil is a very dark red, smooth and somewhat friable silty clay that becomes heavier with depth and grades into a heavy, somewhat sticky, dark-red clay. The latter is reached at a depth of about 20 inches and continues to a depth well below 3 feet.

In a few places the subsoil is not much heavier and only slightly redder than the surface soil. The soil here represents a darker colored variation. Quartz veins cut through the soil in several places, yielding a sand which makes the soil lighter in texture and color than typical. In the northwestern part of the county fragments of the underlying rocks are scattered in small quantities over the surface, although the type generally is free from stony material.

This is not an extensive soil. It occurs only in small areas which are widely separated. The most important of these are centrally located, lying between Danielsville and Bethel Church, while an outlying area from this same formation is found at Wildcat Bridge, on Broad River. Other areas derived from a different rock formation are mapped in the northwestern part of the county between Blacks and Lamar Creeks. These areas begin about 2 miles southwest of Alvin and extend to Fort Lamar. Other areas lie within a 2-mile radius north and southwest of Pocataligo. The type owes its origin to dikes of a very dark, even-colored to "pepper-and-salt" gray, dense, hard diorite and to hornblende schist. The diorite occurs in

vicinity of Danielsville. In the northwestern part of the county the areas are derived from hornblende schist with very narrow dikes of diorite. The distinctive feature of this soil is that it is derived from basic rocks in contrast to the acidic formations which make up nearly the entire county.

The areas of this soil are found on smooth, interstream areas and more or less gentle slopes. All the type has a topography suitable for general farming. Drainage is well established owing to the surface relief.

The soil originally supported a heavy growth of hardwoods with some shortleaf pine. Most of the growth has been removed, and the type now is nearly all cultivated. The common crops of the county are produced with good results. Cotton, the leading crop, in favorable seasons produces from one-half to more than 1 bale per acre. The average yield is probably one-half to three-fourths bale. Corn, under the prevailing system of farming, gives better results on this soil than on any other upland type. On some farms it averages 30 bushels per acre, while on others the yield is about 20 bushels. Oats and wheat average about 15 bushels per acre. Oats in good seasons very often yield as much as 30 bushels, and cowpeas an average of 1 ton or more of cured hay per acre.

Land of this type sells at prices ranging from $40 to more than $150 an acre, depending upon the improvements and location.

The Davidson clay loam is the most productive upland soil of the county. Both soil and subsoil are rich in plant food. This is one of the best soils of the Piedmont region for alfalfa. In Jones County and in other counties of Georgia it is used with great success for the commercial production of peaches. A heavy texture adapts the type to the production of the general farm crops, especially small grains and forage crops. The soil should not be plowed or cultivated when wet, as it is much heavier than the average soils of the county and can be injured in tilth very easily. It has the peculiar property of not turning readily from the plow, and is often spoken of as "push land."

CONGAREE FINE SANDY LOAM.

The surface soil of the Congaree fine sandy loam consists of a brown to slightly reddish-brown, mellow fine sandy loam, which extends to a depth of 8 to 10 inches. The subsoil is a brownish-red to yellowish-brown, heavy, friable, fine sandy loam which may continue to a depth of 3 feet or pass above that depth into a friable, brown silty clay. Both soil and subsoil contain a large quantity of finely divided mica. Locally this type is quite variable in texture, and it includes patches of sandy loam and small areas of silty clay loam.

In a few places along Hudson and Broad Rivers there are included small areas of brown, loose, fine to medium sand underlain at about 7 inches by brownish-yellow sand or fine sand. This soil occurs as natural dikes bordering the stream courses, lying from 15 to 40 feet above the normal water level. It is seldom overflowed except in cases of extremely high water.

The principal area of Congaree fine sandy loam is developed along the South Fork of Broad River just south of Danielsville. The soil, which is alluvial in origin, lies in the first bottoms. The material has been brought down from the surrounding uplands and deposited during high water. The surface is prevailingly flat with a slight slope toward the streams. Except during overflows it is fairly well drained.

About 60 per cent of the Congaree fine sandy loam has been cleared and is under cultivation. The native forest growth consists of oak, hickory, poplar, beech, gum, willow, and some pine.

Corn is the chief crop. Yields average about 25 bushels per acre without the addition of fertilizers or manures. The native grasses afford excellent pasturage for cattle during the greater part of the year. The more sandy areas are less productive than the typical soil. On a few of these more elevated sandy places cotton is grown with a fair degree of success.

Land of the Congaree fine sandy loam, where conveniently located and in a fair state of cultivation, usually sells at about $100 an acre.

This soil can be improved by protection from overflows. Were there no danger of crops being destroyed, this would be one of the better soils of the county.

CONGAREE SILT LOAM.

The soil of the Congaree silt loam is a smooth, friable, brown to reddish-brown silt loam with an average depth of 8 inches. The upper subsoil is a smooth, friable, heavy silt loam which becomes somewhat redder or yellower in color with increasing depth, to 15 to 18 inches where it changes to a yellowish-brown or reddish-brown, smooth, friable silty clay loam. There is some stratification within the 3-foot profile, and here and there a stratum of fine sandy material occurs. Along the immediate banks of the streams there may be small areas of sand.

Two widely separated areas of Congaree silt loam are mapped. One of these occurs in the northern part of the county near Fort Lamar, in the angle of confluence of the Hudson River and Lamar Creek. The second area is located in the southern part of the county at the confluence of the South Fork of Broad River and Beaverdam Creek.

The Congaree silt loam is made up of alluvium composed of material washed from the various disintegrating rocks of the Pied-

mont region. The type is found in smooth, level, or flat bottom lands. It is subject to overflow, but drainage in normal times is good. The area along Beaverdam Creek was naturally not well drained, but with the drainage project involving this stream completed all the soil can be farmed.

The Congaree silt loam is a strong, productive type, and most of it is cleared and either cultivated or used for pasture. All the northern area is used for agriculture. Most of the southern area is used as pasture and for the production of native hay, but a small part remains in the native forest, which consists of a heavy growth of gum, hickory, various oaks, pine, sycamore, beech, birch, and willow. The type is well adapted to forage crops and corn.

Corn and native hay are the chief crops. Corn averages about 25 bushels per acre, although much higher yields are often obtained. Forage crops such as cane and cowpeas average at least 1 ton per acre and sometimes produce as much as 2 tons. A small acreage is used for cotton, which is usually grown in the higher situations near the uplands. A yield of 1 bale per acre is common. No fertilizers are used on this soil. The present selling price of this land is about $125 an acre.

MEADOW (CONGAREE MATERIAL).

The term Meadow (Congaree material) is applied to over 95 per cent of the bottom lands along the various streams of the county, where the material is so irregular in texture and variable in color that definite type distinctions can not be made. The greater part of the material consists of grayish to reddish-brown sands to sandy loams, with some reddish-brown silty clay loam and sandy clay. The material generally is stratified, as is shown in the drainage cuts along Beaverdam Creek. The strata vary from a fraction of an inch to an inch or two in thickness, and include almost all textures of soil, with a range in color from gray to red. In some places the surface material consists of light-gray sand, recently washed in, and below this there may be a layer of silty clay loam which in turn is underlain by sand. In other places the surface material is a brownish-red, friable silty clay loam, which is underlain by sand and loamy sand. There are very few areas in which uniformity is found.

Meadow (Congaree material) is mapped along nearly every stream in the county. The material has been washed down from the surrounding hills and deposited along the stream courses. As each overflow is of different intensity and volume, it carries and distributes material of different sizes, causing the numerous variations.

The bottom lands are level to flat, with a gentle slope toward the stream channel. They are subject to overflow and some of them remain wet during the greater part of the year, while others are fairly well drained.

Practically all of the Meadow has been cleared of the heavy growth of many species of hardwood and shortleaf pine. On a few areas of sandier texture a growth of willow is found. Corn is the chief cultivated crop. It averages about 25 bushels per acre, although yields of 60 bushels are reported. Sorghum for sirup and for forage is also produced. A large part of the bottom lands is used for pasturage.

Land of this type is generally held at a price exceeding $100 an acre. Drainage operations carried out along Beaverdam Creek and part of Brush Creek have enhanced the value considerably. Clearing the channels of the streams and widening and straightening them would further increase general values.

SUMMARY.

Madison County lies in the northeastern part of the State of Georgia, the eastern boundary being 26 miles from the South Carolina line. It embraces an area of 284 square miles, or 181,760 acres.

The county is a part of the Piedmont Plateau and ranges in topography from gently undulating through gently rolling to hilly. Stream action has been the chief agency in molding the surface features. The more hilly regions are the uplands close to Broad and Hudson Rivers. There is a very small percentage of land on which improved farm implements can not be used.

The drainage of the entire county is well established. There are many streams traversing the upland, and branches subdivide until almost every farm is touched by a drainage way. Hudson River, Broad River, and the South Fork of the latter are the main streams.

This county was created in 1811. In 1910 it had a population of 16,851, all of which is classified by the census as rural.[1] Danielsville is the county seat. Comer is the largest town. Carlton and Colbert are small but locally important trading points. Athens and Atlanta are the chief outside markets.

The climate of the county is marked by long summers and short open winters. Agricultural operations can be carried on practically all the year. The length of the growing season ranges from 220 to 230 days. The rainfall is plentiful and well distributed for growing crops.

The present agriculture of the county is centered about cotton, which is the only cash crop. Corn, oats, wheat, and other crops are grown more or less extensively on all the farms. The production of live stock and animal products is insufficient to meet the local needs.

Cotton was grown on 52 per cent of the improved farm land in the county in 1909. It occupied a total of 46,160 acres and produced 19,444 bales, or an average of 0.42 bale per acre.

Corn is the second crop in importance. In 1909 there were 218,517 bushels produced, on 22,621 acres, or an average of 9.7 bushels per acre.

[1] See footnote, page 7.

The usual acreage of oats and wheat is 3,000 or 4,000 acres each. Average yields are about 12 and 8 bushels, respectively.

There is little recognition given to the natural adaptation of crops to certain soils. Little attempt is made to rotate crops.

The general methods of handling the various crops and of preparing the land are improving. The methods common to the cotton belt are used.

Ready-mixed commercial fertilizers are used with cotton. The usual application is 200 pounds of an 8–2–2 to 10–2–2 grade per acre. In 1909 the fertilizer expenditure for the county was $159,218, 90 per cent of the farms reporting an outlay.

In 1910, 75.6 per cent of all the farms were operated by tenants. There has been a steady increase in the percentage for many years.

The upland soils of the county are residual, derived from various kinds of rock, chiefly light colored or acidic. The soils are generally sandy loams or sandy clay loams.

The soils of the Madison series are derived from quartz-mica schist carrying some garnet. They are extensively developed in the north-central and northeastern parts of the county and comprise some of the younger farming lands. Fairly good yields of all crops are obtained.

The greater part of the Cecil sandy loam and sandy clay loam is derived from gneiss and granite intermingled with a quartz-mica schist. They comprise some of the best lands of the county and are extensively farmed. Good yields are obtained where the land is judiciously handled. The Cecil clay loam is a strong, productive soil derived from a mixture of acidic and basic rocks. High yields are obtained, and practically all of the type is under cultivation.

The Appling sandy loam is typically developed in various-sized areas scattered over the entire county. It is farmed to a large extent. Yields are somewhat lower than on the Cecil series.

The Durham sandy loam is of small extent, but most of it is farmed to the general crops. It is a special-crop soil.

The Davidson clay loam is the strongest upland soil of the county, but it is of very small extent. It is derived from basic rocks such as diorite and hornblende schist. It is a good general-farming type and is especially suited for alfalfa.

The alluvial or first-bottom soils of the county belong to the Congaree series and Meadow (Congaree material).

The Congaree fine sandy loam and silt loam are productive soils, especially for corn. Most of the former type is used for pasture.

Meadow (Congaree material) comprises the greater part of the stream bottoms. The soil material here is very much mixed. High yields of corn and sorghum are obtained on parts of this land.

○

[PUBLIC RESOLUTION—No. 9.]

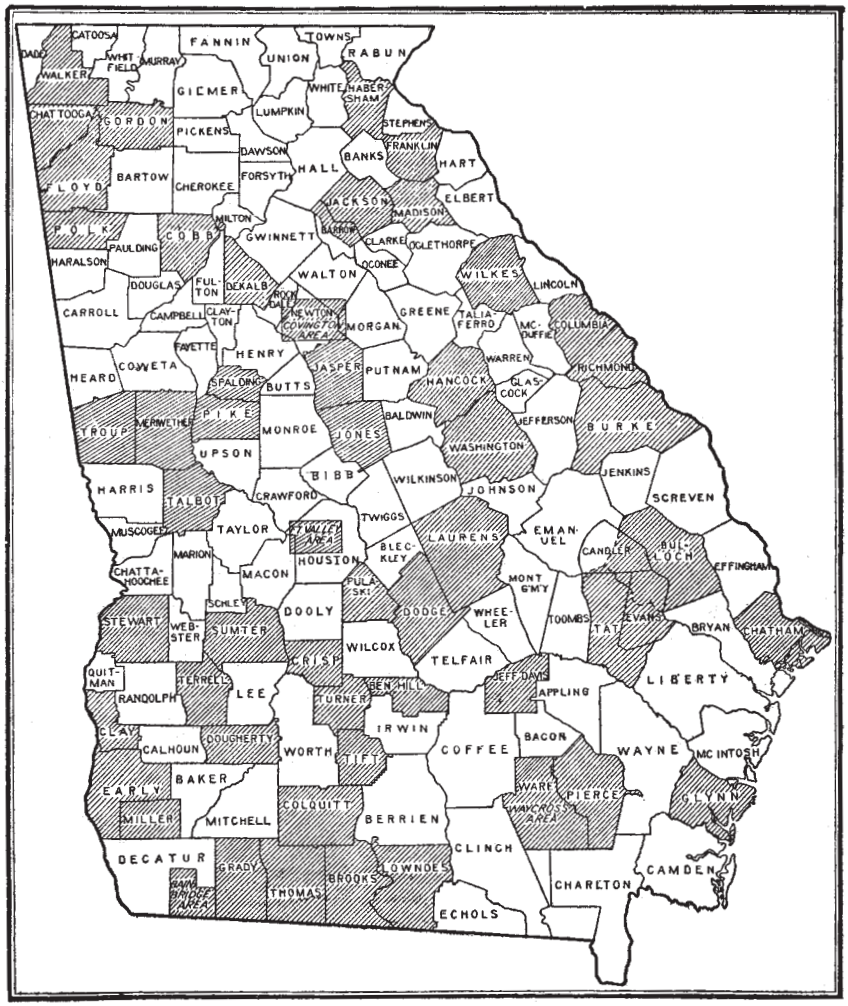
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

"That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture."

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.



Areas surveyed in Georgia.

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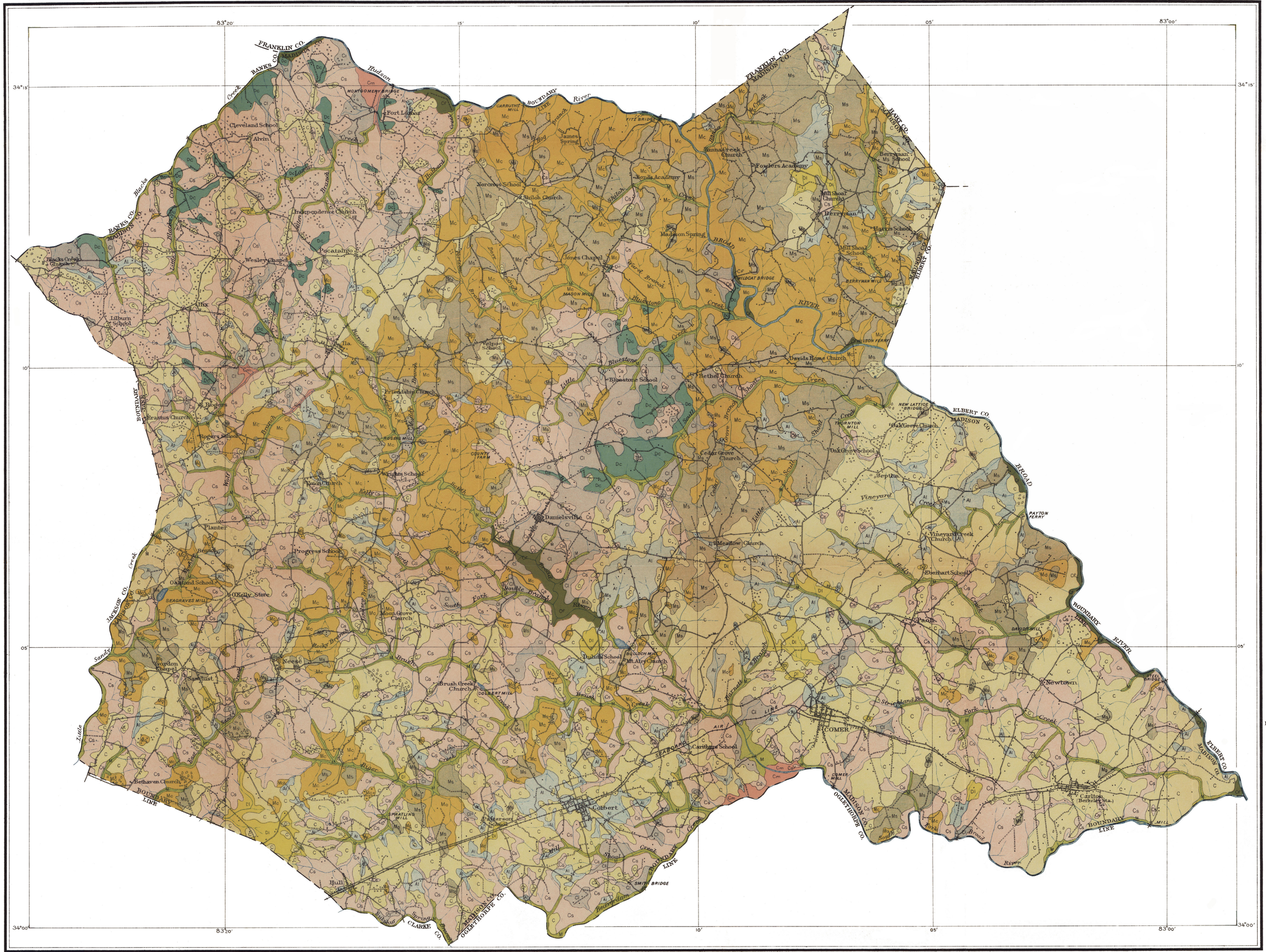
U. S. DEPT. OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF
CURTIS F. MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP
GEORGIA
MADISON COUNTY SHEET

GEORGIA STATE COLLEGE OF AGRICULTURE
ANDREW M. SOULE, PRESIDENT
DAVID D. LONG, IN CHARGE SOIL SURVEY



LEGEND

Appling sandy loam — Al	Davidson clay loam — Dc
Cecil sandy loam — C	Durham sandy loam — Dl
Cecil sandy clay loam — Cs	Madison gravelly sandy loam — Ms
Cecil clay loam — Cl	Madison gravelly sandy clay loam — Mc
Congaree fine sandy loam — Cf	Meadow (*Congaree material*) — M
Congaree silt loam — Cm	

CONVENTIONAL SIGNS

CULTURE
(Printed in black)

- City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, lighthouse, Fort.
- Secondary roads and Trails
- Railroads: Steam and Electric (Double track, Single track, Waterbound, In road)
- Bridges, Ferry
- R.R. crossings, Tunnel (R.R. above, R.R. below)
- Ford, Dam
- School or Church, Cemeteries
- Mine or Quarry, Mine dumps, Made land
- Bluff, Escarpment, Rock outcrop, and Triangulation station
- Stony and Gravelly areas
- Soil boundaries
- Boundary lines (State, County)
- Boundary lines (Land grant, City or village)
- Boundary lines (Civil township, Reservation)
- U.S. township and section lines

RELIEF
(Printed in brown or black)

- Contours, Depression contours
- Prominent Hills, Mountain Peaks
- Sand, Wash, and Sand dunes
- Shore and Low water line, Sandbar

DRAINAGE
(Printed in blue)

- Streams
- Lakes, Ponds, Intermittent lakes
- Intermittent streams
- Springs, Canals and Ditches, Flumes
- Swamp, Salt marshes
- Submerged marsh, Tidal flats

The above signs are in current use on the soil maps. Variations from this usage appear in some maps of earlier dates.

W. Edward Hearn, Inspector, Southern Division
Soils surveyed by David D. Long of the Georgia State College of Agriculture.

1 ½ 0 1 2 3 4 Miles
Scale 1 inch = 1 mile

LITHO. A. HOEN & CO. BALTO. MD.

Field Operations
Bureau of Soils
1918.